BEFORE THE MINNESOTA PUBLIC UTILITIES COMMISSION

COMMENTS AND RECOMMENDATIONS OF THE MINNESOTA OFFICE OF ENERGY SECURITY ENERGY FACILITY PERMITTING STAFF

DOCKET NO. IP-6701/WS-08-1233

Meeting Date: October 21, 2010 ..... Agenda Item # _____

Company: **AWA Goodhue, LLC**

Docket No. **PUC Docket Number: IP-6701/WS-08-1233**

In the Matter of the Application of AWA Goodhue, LLC for a Large Wind Energy Conversion System (LWECS) Site Permit for the 78 MW Goodhue Wind Project in Goodhue County.

Issue(s): Should the Commission grant a site permit to Goodhue Wind, LLC for the 78 MW Goodhue Wind Project?

OES EFP Staff: Larry B. Hartman 651-296-5089

Relevant Documents

ALJ Summary of Public Testimony ..... September 7, 2010
Master Exhibit List from Public Hearings ..... July 30, 2010
Hearing Transcripts, Volumes 1 through 4 ..... August 23, 2010
Goodhue Wind Truth [Redlined Draft Site Permit] ..... August 6, 2010
Goodhue Wind Truth [Proposed Sound Standards] ..... August 6, 2010

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Goodhue Wind Truth [Phillips Refutation of CMOH Report] ..... August 6, 2010
Goodhue Wind Truth [Additional Testimony of Rick James] ..... August 6, 2010
Goodhue Wind Truth [Comments-Cover] ..... August 6, 2010
Goodhue Wind Truth [Comments 2 of 2] ..... August 6, 2010
Goodhue Wind Truth [Comments 1 of 2] ..... August 6, 2010
AWA Goodhue, LLC [Comments-Cover] ..... August 6, 2010
AWA Goodhue, LLC [Comments-Appendix A] ..... August 6, 2010
AWA Goodhue, LLC [Comments-Figures 1, 2, and 3] ..... August 6, 2010
Erin Logan [Wind Access Buffer, Noise Levels, Buffer Compliance, Modeling] ... August 6, 2010
AWA Goodhue, LLC [All exhibits filed on July 19, 2010] ..... July 19, 2010
Goodhue Wind Truth [All exhibits filed on July 19, 2010] ..... July 19, 2010
Site Permit Application for Goodhue Wind ..... October 24, 2009

The enclosed materials are work papers of the Office of Energy Security (OES) Energy Facility Permitting (EFP) Staff. They are intended for use by the Public Utilities Commission and are based on information already in the record unless otherwise noted.

Documents Attached:
1. Goodhue Wind Project Site Maps
2. Proposed Findings of Fact and Conclusions
3. OES EFP Staff Exhibit List
4. Proposed Site Permit

Note: see eDockets filings at (08-1233) or the Commission website at: http://energyfacilities.puc.state.mn.us/Docket.html?Id=25631 for additional project related documents.

Statement of the Issue

Should the Commission grant a site permit to AWA Goodhue, LLC for the 78 MW Goodhue Wind Project?

Introduction and Background

AWA Goodhue, LLC applied for a site permit on October 19, 2009; it was accepted by the Commission on November 30, 2009.

Project Location and Land Control
The proposed Goodhue Wind Project will be located in south-eastern Goodhue County on agricultural land west of the city of Goodhue and north of the city of Zumbrota. The project boundary encompasses approximately 32,684 acres and includes portions of Belle Creek (sections 1-5, 8-17, 20-29, 32-36); Goodhue (sections 17-19, 30 and 31); Minneola (sections 1-5, 8-17); Vasa (sections 35 and 36), and Zumbrota (sections 4-6, 7-9, 16-18) Townships. The topography within the site is relatively flat, but includes hills and ridges associated with water drainage. Elevation varies from 929 to 1,243 feet above mean sea level. The project area is predominantly rural and is zoned agricultural. Crops include corn, soybeans, small grains and forages. Windbreaks are common around farmsteads; willows, grasses, and sedges are found near streams and ditches.

Goodhue Wind has obtained leases and wind rights from approximately 215 landowner(s), for approximately 100 parcels of land totaling more than 12,000 acres of land within the project boundary. These wind and land rights easements will be used to site the turbines, associated facilities, and provide the necessary wind access buffers and setbacks defined by conditions in the site permit. The project's transmission lines will be located on lands for which AWA Goodhue has the rights to use or in public rights-of-way.

Project Description
The Project for which a permit is being requested includes the following facilities:

1. The Goodhue Wind Project involves construction of a combination of up to 50 GE 1.5 MW xle and 1.6 MW xle wind generators mounted on 80 meter (262.5 foot) towers with a rotor diameter of 82.5 meters (271feet). The overall height of the

tower, nacelle and blade will be approximately 121 meters (397 feet) when one blade is in the vertical position
2. Gravel access roads
3. An underground energy collection system
4. An underground automated supervisory control and data acquisition system (SCADA) for communication purposes
5. Permanent meteorological towers (up to two) that will be used as part of the communication system

Other components of the project include a concrete and steel foundation for each tower, pad-mounted step-up transformers, an operation and maintenance building and two project substations. The northern 39 MW of the project will interconnect to an existing 69 kV transmission line adjacent to the existing Vasa Substation approximately three miles north of the project via a new 69 kV transmission line. The southern 39 MW will interconnect to an existing 69 kV transmission line near the existing Goodhue Substation. Goodhue County and the townships have responsibility for permitting the two 69 kV transmission lines and O & M building.

The Project is scheduled for an expected in-service date of September 30, 2011.

Regulatory Process and Procedures

A site permit from the Commission is required to construct a Large Wind Energy Conversion System, which is any combination of wind turbines and associated facilities with the capacity to generate five megawatts or more of electricity. This requirement became law in 1995. The Minnesota Wind Siting Act is found at Minnesota Statutes Chapter 216F. The rules to implement the permitting requirement for LWECS are in Minnesota Rules Chapter 7854.

Certificate of Need

A Certificate of Need (CN) from the Commission for a large electric power generating plant is also required because the Project exceeds 50 MW in size (Minn. Stat. 216B.243). On October 15, 2009, AWA Goodhue filed an Application for a CN and on December 30, 2009, a Commission Order accepted the CN application [See PUC Docket No. IP-6701/CN-09-1186]. A site permit cannot be granted before a CN is issued. OES EFP staff combined portions of the site permit public participation process with portions of the environmental review process in the CN proceeding for the Project, as has been done in several recent cases to achieve efficiencies. This included combining notices, a public information and environmental review scoping meeting and comment periods. An Environmental Report (ER) was prepared by OES EFP staff on June 29, 2010, for the CN proceeding. Upon completion of the environmental report, OES posted notice of Public Hearing and Environmental Report Availability on eDockets and the Commissions web page. Notice was also published in the *Cannon Falls Beacon* on July 8, 2010, the *Red Wing Republican Eagle* on July 7, 2010, and the *Zumbrota News-Record* on July 7, 2010. The Office of Administrative Hearings conducted a public hearing on the CN proceeding, including the environmental report, on July 21 and 22, 2010.

Site Permit Application and Acceptance
On October 19, 2009, Goodhue Wind filed a revised site permit application and on November 30, 2009, a Commission Order accepted Goodhue Wind's site permit application for the Goodhue Wind Project. An OES notice of site permit application acceptance was issued on December 4, 2009. The applicant distributed the site permit application and notice of application acceptance to local, state and federal governmental agencies and to landowners.

Preliminary Determination on Draft Permit
On May 3, 2010, a Commission Order made a preliminary determination that a Draft Site Permit may be issued for the Goodhue Wind Project and corrected the Order on May 6, 2010, by attaching the Draft Site Permit to the Order, which was not attached to the May 3, 2010, Order. This Order allowed EFP staff to proceed with the notice requirements of Minnesota Rules 7854.0800 and 7854.0900. On May 20, 2010 "Notice of Availability of Draft Site Permit" was distributed to residents and governmental agencies as required by rule. The "Notice of Availability of Draft Site Permit" was published in the *Cannon Falls Beacon*, the *Red Wing Republican Eagle*, the *Zumbrota News-Record* and the *EQB Monitor.*

Public Participation Process and Public Comments
The rules provide opportunities for the public to participate in deliberations on the LWECS site permit application. The public was advised of the submission of the site permit application after the site permit application was accepted. Public comments on information in the application and application completeness were accepted through January 22, 2010.

OES EFP staff received public comments on the site permit application from 10 citizens and four government agencies, and they are summarized in the OES EFP Comments and Recommendations presented to the Commission at its April 15, 2010, meeting in conjunction with the request for issuance of a Draft Site Permit for the Goodhue Wind Project.

On February 12, 2010, OES EFP staff issued a "Notice of Public Information and Scoping Meeting" to provide information about the proposed Project and to announce that a public meeting would be held on March 4, 2010 to take public comment and input on issues to be considered in the scope of the Environmental Report to be prepared for the Certificate of Need.

The OES EFP staff held public information and scoping meeting on March 4, 2010, at the Zumbrota-Mazeppa Middle School in Mazeppa, Minnesota, to provide an overview of the Commission permitting process and to receive comments on the scope of the Environmental Report. Approximately 200 people attended the meeting. Representatives from AWA Goodhue were also present, as was a representative of the Commission. OES EFP staff provided an overview of Certificate of Need (CON) and LWECS site permitting processes and responded to questions. OES EFP staff and AWA Goodhue responded to project specific questions and general questions about wind energy. The deadline for submitting comments regarding the scope of the Environmental Report was March 26, 2010.

Approximately 110 separate written comments were received during the comment period on the scope of the Environmental Report. Concerns raised at the public meeting and in written comments included: potential impacts to property values, aesthetics, public health and safety

related issues, livestock, wildlife (birds, bats, game animals and other wildlife in the project area), wildlife habitat, TV and radio reception, internet connections, GPS interference, stray voltage, loss of productive agricultural land, radar facilities, the Prairie Island nuclear facility, private landing strips, Mayo One emergency medical helicopter service, aerial crop applications, population density, setbacks, shadow flicker, noise (audible and infrasound) as a result of turbine installation, quality of life issues, water quality, road damages and turbine lighting. Other comments raised concerns regarding the need for wind energy and suggested other fuel types, such as solar, nuclear, biomass, hydropower, and methane digesters and locating the proposed facilities elsewhere.

Goodhue Wind Truth filed a request for a contested case hearing in this matter on February 12, 2010. On April 15, 2010, the Commission considered whether to grant a contested case for this matter and whether to issue a draft site permit for the Project. On May 3, 2010, the Commission issued an Order Approving Distribution of the Draft Site Permit and Denying Contested Case but ordered that "the scope of the public hearing on the Applicant's request for a Certificate of Need proceeding in Docket No. IP-6701/CN-09-1186 is hereby expanded to the extent feasible to include siting matters related to the Draft Site Permit issued in this Order."

On July 21, 2010, and July 22, 2010, a public hearing was held at the Goodhue High School in Goodhue, Minnesota, to receive public testimony on need and siting matters. Approximately 200 persons attended the public hearings, which included one afternoon and one evening session each day, and 56 persons provided oral testimony. Public comments and exhibits were recorded and entered into the record, with additional written comments allowed to be submitted on or before August 6, 2010.

Administrative Law Judge (ALJ) Eric L. Lipman presided over each session of the public hearing on July 21, 2010, and July 22, 2010. The ALJ's Summary of Public Testimony was submitted to the PUC on September 7, 2010. See Relevant Documents and Master Exhibit List.

Standard for Permit Issuance

The test for issuing a site permit for a Large Wind Energy Conversion System is to determine whether a project is compatible with environmental preservation, sustainable development, and the efficient use of resources. Pursuant to Minnesota Statutes section 216F.02, certain sections of Minnesota Statutes chapter 216E (Minnesota Power Plant Siting Act) apply to siting LWECS, including 216E.03, subd. 7 [Considerations in designating sites and routes]. Also, the law allows the PUC to place conditions in LWECS permits [Minnesota Statutes 216F.04 (d)].

OES EFP Staff Comments and Analysis

"Relevant Documents" referenced earlier, include the ALJ's "Summary of Public Testimony," the "Hearing Transcript," and the "Master Exhibit List," which includes the pre-filed testimony of AWA Goodhue, LLC and AWA Goodhue Wind Truth, as well as their post-hearing comments and all other comments received at the hearing and by August 6, 2010, the deadline for comment submittal. OES EFP staff has prepared a separate exhibit list, which includes many jurisdictional documents that are also part of the record, but not identified in the Master Exhibit List. All documents that are part of the site permit proceeding are available for viewing on eDockets 08-1233.

The ALJ's "Summary of Public Testimony" provides a clear, but concise overview of the issues covered by extensive oral testimony and numerous written comments submitted into the hearing record. The applicant, AWA Goodhue, and Goodhue Wind Truth both submitted pre-filed testimony and post-hearing comments into the hearing record (See relevant documents).

The following comments and analysis generally conform to the format in the ALJ's "Summary of Public Testimony." OES has excerpted sections of the ALJ's Summary as noted by quotation marks. As noted by the ALJ, "the record developed in this matter is considerable – including books, charts, photographs, scientific treatises and documents of every size and description – the materials themselves can be readily divided among four distinct categories."

Interested members of the public submitted comments and materials on: (1) the externalities that come from operating wind turbines; (2) the best practices for turbine siting and operation; (3) concerns as to the specific features of AWA Goodhue's application; and (4) the key claims of the project's proponents.

1. Externalities from Turbine Operation

A. Turbine Noise (Excerpt from ALJ'S Summary)

"Numerous residents (26) of Goodhue County objected to the noise that will be produced by the wind turbines.

An important focus of the hearing testimony and the later comments was the decibel level at which residents are thought by some to begin to suffer serious health impacts. The threshold level is vigorously disputed – and both proponents and opponents of the project point the Commission toward the underlying scientific literature.

For example, the Goodhue County Planning Advisory Commission concludes that the nighttime residential noise standard of 50-55 dB set by the Minnesota Pollution Control Agency in Minn. R. 7030.0040 does not adequately protect the health of the citizens of Goodhue County. It points the Commission to the Minnesota Department of Health's 2009 publication "Public Health Impacts of Wind Turbines." In that publication, the MDH opined that the low frequency sound generated by wind turbines is a nighttime sleep issue because the walls and windows of homes block higher frequencies better than they shield out lower frequency noise. Further, MDH concluded that Minn. R. 7030.0040 appears to underweight penetration of low frequency noise into dwellings – with the possible result of sleep deprivation. The Advisory Commission believes that the research underlying the MPCA's standard is dated and that it should not be given deference by the Commission because it is not based upon current research and does not reflect current scientific knowledge. After consulting with the Goodhue County Public Health Director, the Advisory Commission advocates for a nighttime outdoor standard of 40 dB.

Goodhue residents Bruce and Marie McNamara hired sound engineer and acoustician Richard James to conduct noise tests and provide testimony relating the AWA Goodhue project. At the McNamara's request, Richard James, of E-Coustic Solutions, performed studies at test sites in Goodhue County between July 20 and 22, 2010. Mr. James opined that the nighttime noise level

at an isolated residential lot in Goodhue County was 20 to 25 decibels (dBA). According to AWA Goodhue's sound modeling studies, this same property will experience a background sound level of 43 dBA once the wind turbines are in place. Mr. James concluded that the sounds of nature that currently comprise the nighttime soundscape will be replaced by the sound of wind turbines.

Moreover, Mr. James indicated that a 5 dBA increase in background sound levels is noticeable to people but unlikely to generate complaints. An increase of 10 dBA, however, often causes complaints from individuals. If there is a background sound level of 45 to 50 dBA at non-participating properties, Mr. James predicts a set of severe health impacts. Accordingly, Mr. James urges more stringent noise standards than those called for by the MPCA or the MDH.

The Applicant takes strong issue with Mr. James' calculations, methodologies, modeling techniques and the verifiability of his methods. It asserts that the average project-related noise level is quieter than the quietest average noise level in the community.

The Applicant casts doubt on the merit of Mr. James' assessments when it argues that "Mr. James does not provide evidence of the measurements he claims to have made, does not provide an explanation of the monitoring methodology he used, and does not provide evidence concerning the quality and accuracy of the measurement equipment or if his work product has undergone a quality control review by a qualified environmental acoustician.

John Meyer, a resident of Stewartville, Minnesota, argued that the noise concerns raised by those opposing the project are exaggerated. He claimed that the decibel measurements at the home sites are taken outside the residences and that the sound experienced inside these dwellings will be significantly less. He asserted the many residential air-conditioning units produce sound levels up to 76 decibels. Mr. Meyer argued that in the absence of conclusive scientific data as to the harmful effects of wind turbine noise, the Commission should approve the project."

OES EFP Response: Goodhue Wind evaluated the sound power level (Lp) information provided by the manufacturer of the GE 1.5 MW wind turbine to assess representative noise levels for the Project. The distance to the 50 dB(A) noise setback isolines is (531 feet) 162 meters. Goodhue Wind has incorporated setbacks of at least 1,000 feet (304 meters) from residences of project participants and 1,500 feet (457 meters) from the residences of non-participants to stay below the Minnesota Pollution Control Agency (MPCA) Nighttime Noise Limit of 50 dBA. The noise setback is based upon the calculated distance to the 50 dB(A) noise level for the highest noise or "worst case" noise scenario output associated with the wind turbines selected for this Project.

A *Wind Noise Assessment* for the Goodhue Wind Project, dated July 16, 2010, prepared by HDR, Inc., evaluated the project noise levels at 482 receptors within and near the site. Using the Cadna-A wind turbine noise model, the maximum noise level from all wind turbines operating simultaneously at their highest rated operating speed is calculated to be 43 dBA at the nearest noise-sensitive receptor. The HDR analysis also indicate "noise levels of any residence will be more than 2 dB below a 45 dBA noise limit based on the MPCA nighttime L50 noise limit of 50-dBA with a 5 dB buffer as a surrogate for low-frequency noise suggested by the Minnesota Department of Health.

Several members of the public have contested the appropriateness of the Cadna-A model. The Cadna-A model is based on internationally accepted acoustical standards used to calculate outdoor noise and has been used to model a variety of wind projects throughout the world, including many in Minnesota.

Some commenter's also testified that the state MPCA noise standards are inadequate to protect public health. For example, a subcommittee of the Goodhue County Planning Advisory Commission advocated for an outdoor nighttime standard of 40 dBA. (OES Exhibit 18, fn.13). The MPCA's noise standards, when enacted, were based on the present knowledge for the preservation of public health and welfare. The standards adopted were consistent with speech, sleep, annoyance, and hearing conversation requirements for receivers within areas grouped according to land activities. Based on current science, there is no conclusive evidence that sound from wind turbines at levels consistent with or below the MPCA noise standards pose any risk to human health.

The Applicant's modeling shows that, at the setback distances of 1,500 feet for non-participants and 1,000 feet for participants, the project complies with the MPCA's Nighttime L_{50} limit of 50 dBA, its most stringent standard. Noise impacts to nearby residents and other receptors have been factored into the turbine micro-siting process, and conditions in the site permit require the project to comply with the MPCA noise standards (See Section 4.3 and 6.6).

At the Acoustical Society of America 159th Meeting Lay Language Papers, on April 19, 2010, Robert D. O'Neal from Epsilon Associates, Inc., presented a paper titled "*Low Frequency Sound and Infrasound from Wind Turbine."* In his summary Mr. O'Neal, reported: Wind farms with Siemens SWT-2.3-93 and GE 1.5 sle wind turbines at maximum noise at a distance more than 1,000 feet from a residence do not pose a low frequency noise or infrasound problem. At this distance the wind farms:

1) Meet American National Standards Institute/ASA S12.2 indoor levels for low frequency sound for bedrooms, classrooms and hospitals;
2) Meet ANSI/ASA S12.2 indoor levels for moderately perceptible vibrations in light-weight walls and ceilings.
3) Meet ANSI S12.9 Part e thresholds for annoyance and beginning of rattles;
4) Meet United Kingdom Department for Environment, Food and Rural Affairs disturbance based guidelines;
5) Have no audible infrasound to the most sensitive listeners; and
6) Might have slightly audible low frequency noise at frequencies at 50 Hz and above depending on other sources of low frequency noises in homes, such as refrigerators or external traffic or airplanes. However, audible noise in these low frequencies already exists from other sources.

B. Shadow Flicker (Excerpt from ALJ's Summary)

"Several residents of Goodhue County expressed concerns over the impacts of shadow flicker from the rotation of the turbine blades. For example, Owen Scheffler, of Zumbrota, Minnesota,

maintains that 38 residences outside the permitted footprint for the project will experience some impacts of shadow flicker.

Still others worried that the shadow flicker could cause headaches and dizziness whether they were inside or outside of their homes when light was reflected off of spinning turbine blades.

The Applicant's projections are that at the latitude of the project, flicker will occur during less than 1 percent of the daylight hours."

***OES EFP Response*:** Shadow flicker is the alternating change in light intensity when moving turbine blades cast shadows on the ground and objects, such as windows in residences. Shadow flicker in not caused by viewing the sun through rotating wind turbine blades or moving through the shadows of a wind energy facility, or sunlight reflected from turbine blades.

Potential shadow flicker from wind turbines can only occur when (1) the sun is very low in the sky; 2) a receptor is very close to the turbine; (3) the receptor is oriented toward a turbine; (4) the receptor has an unobstructed line of sight; and (5) the weather conditions include bright sun.

When all these factors exist, they may produce a pulsating shadow which may or may not be perceptible. Shadow flicker frequency is related to the rotor speed and number of blades on the rotor, which can be converted into a "blade pass frequency" measured in alternations per second or hertz (Hz). The existence and intensity of shadow flicker are also affected by a number of factors including:

- The strength of the sun as affected by cloud cover.
- The line of sight of the observer relative to the sun and the turbine. This is related to the sun's height in the sky, which varies with latitude and longitude, time of day, and time of year.
- The distance between the observer and the turbine affects the distinctness of the shadows.
- The presence of obstructions such as buildings or vegetation.
- The orientation of the turbine depending on wind conditions. When the turbine is facing the sun, shadow flicker is greater behind the turbine; when the turbine is rotating in line with the sun, there is much less flicker.

In some instances the flickering of light can induce epileptic seizures in people who are photosensitive (about 3-5 percent of the 1 percent of Americans who are epileptic are photosensitive). Whether light flicker will provoke a reaction depends on its frequency, light intensity, visual area, image pattern, and color (Epilepsy Foundation 2009). Flicker frequency due to a turbine is on the order of the rotor frequency, i.e., 0.6-1.0 Hz. The flicker frequency that provokes seizures in photosensitive individuals is 5-30 Hz, well above the maximum of approximately 1 Hz for wind turbines. Shadow flicker from wind turbines is too slow to induce epileptic seizures. There is no scientific data or peer-reviewed studies that suggest a link between epileptic seizures and rotor blade revolutions.

A *Shadow Flicker Assessment of the Goodhue Wind Project* was prepared by HDR, Inc., for AWA Goodhue, dated July 10, 2010. The assessment calculated shadow flicker exposure for 290 potential receptors within the project vicinity. The assessment calculated the "actual expected shadow" based on the following inputs: (1) location of the wind turbines and receptors; (2) the topography in the project area; (3) the type of turbine used for the project (GE 1.5 MW and 1.6 MW xle turbines); (4) sunshine probability statistics from the NOAA's National Climatic Data Center; and (5) wind direction. The "actual expected shadow" model also includes several conservative assumptions, such as assuming the wind turbines operate 100 percent of the time and that all receptors live in a "greenhouse," meaning that a receptor's view is never obstructed from any direction by walls, vegetation, other buildings, etc.

Considering these assumptions, the results of the shadow flicker modeling indicated 254 of the 290 receptors will experience less than 10 hours of shadow flicker per year, and 279 of the 290 receptors are anticipated to receive less than 20 hours of shadow flicker per year. For some receptors, shadow flicker is expected during working hours when residents may not be at home. The shadow flicker model also assumed several conservative assumptions. The model assumed that all receptors had a direct inline view of incoming shadow flicker ("Green House") mode, when in reality windows will not always be facing the sun when shadow flicker is expected to occur. The model did not consider the effect of screening (e.g., trees and buildings), degree of visibility, and factors affecting operations that will influence shadow flicker. Therefore, shadow flicker is expected to be less than suggested by the modeling assumptions. Over 96 percent of the 290 receptors are expected to experience fewer than 20 hours of shadow flicker per year. Goodhue Wind has strived to minimize flicker through its micro-siting efforts and will continue to do so. The site permit at 6.2 directs the applicant to document its efforts to minimize shadow flicker.

There are no published standards for shadow flicker and no examples of turbines causing photosensitivity related problems. In Germany, 30 hours of shadow flicker per year is acceptable. The 30 hour number is based on the premise that the sun is shining, the building affected is occupied, the occupants are awake and the turbine is operating. The site permit does not contain shadow flicker limits.

C. "Ice Throw" from Turbines (Excerpt from ALJ's Summary)

"A number of residents expressed concern over the damage that could be caused if large chunks of ice were permitted to build up on turbine blades and were later thrown from the moving blades.

For example, Douglas and Eileen Sommer criticized as unworkable AWA Goodhue's plan to "provide a means of alerting people coming within 300 meters (984 feet) for the potential of an icing condition near the turbine." The Sommers assert that there should be minimum setbacks on heavily traveled roads of between 1000 to 1500 feet. Included with their comments was a booklet published by turbine manufacturer General Electric, entitled "Ice Shedding and Ice Throw – Risk and Mitigation."

Eager to protect snowmobilers in the event of ice throw, the Department of Natural Resources (DNR) recommends that any siting permit include a condition requiring either a setback from snowmobile trails in the area for safety purposes, or a requirement that the Applicant consult with DNR staff regarding trail locations."

OES EFP Response: In winter months ice (Rime or Glace) can form on a turbine given the right combination of temperature and moisture. Rime ice occurs when objects such as trees, power line or wind turbines are exposed to low temperatures when fog is present. Depending on the duration of the ice conditions, significant amounts of rime ice can build up on the turbine and blades, which will lead to an increase in static and dynamic load conditions on turbine blades. Glace ice occurs when a warm front moves in above cold air. The subsequent falling rain can cool down to temperatures below the freezing point without freezing into solid ice. If the cold rain hits the surface or objects with temperatures below 32 degrees, it will turn into a layer of solid ice.

Studies indicate that the majority of ice throws are small, typically less than two ounces, though larger ice fragments can occur. The majority of ice throws occur within the turbine rotor diameter.

Typically under icing conditions, the turbine would shut down if the blades become unbalanced and the vibration sensors stop the turbine. As weather conditions change, any ice will normally drop off the blades in relatively small pieces before the turbines resume operation. This is due to flexing of the blades and the blades' smooth surface.

Long-term data from the Minnesota Cliamte Center indicate that icing occurs about 2.5 days per year in Minnesota. Although turbine icing is an infrequent event in Minnesota, it remains important that the turbines are not sited in areas where regular human activity is expected below the turbines during the winter months. Staff believes that turbine setbacks from residences and roads are adequate to minimize impacts from ice throw. No impacts from wind turbine ice throws have been documented in Minnesota. See Finding 72 and site permit at Section 4.

D. Impacts to Aircraft Radar and Air Traffic Control (Excerpt from ALJ's Summary)

"Several residents expressed concern that rotation of large numbers of turbine blades would interfere with radar for military aircraft and air-traffic control. Particularly because the project footprint is not far from the Prairie Island Nuclear Facility, these individuals expressed the concern that untoward effects upon civilian and military radar presents a national security threat.

Rochelle Nygaard, of Belle Creek Township, Minnesota, submitted the statement of Nancy Kalinowski, Vice President for System Operations Services with the Federal Aviation Administration. Ms. Kalinowski testified before the U.S. House Armed Services Committee in July of this year regarding the impact of wind farms on military readiness. Ms. Kalinowski testified that "[t]he clutter that is created by wind turbines can result in a complete loss of primary radar detection above a wind farm. When that clutter occurs, it appears at all altitudes, so simply directing the aircraft to a different altitude does not solve the problem."

OES EFP Response: Wind turbines may impact radar systems, e.g., radar used for aviation, if they are in the radar line of sight. Impacts may include an impairment of the ability to detect and track aircraft. Impacts can be mitigated by avoiding the placement of wind farms in radar lines of sight. All structures in excess of 200 feet in height must be authorized by the Federal Aviation Administration.

FAA review through its airports division, coordinates review with the Air Force, which also represents the Army and Navy, and Homeland Security and includes coordination and review with: a) the service area office which is responsible for evaluating the proposal from the standpoint of safe and efficient use of airspace by aircraft; b) the flight procedures office which is responsible for evaluating proposals to determine impacts on instrument procedures and whether aircraft instrument operation can be conducted safely; c) the flight standards division which is responsible for reviewing proposal to determine the safety of aeronautical operations, and of persons and property on the ground; d) the flight standards district office which is responsible for seaplane bases and heliports; and e) and the technical operations services area office which is responsible for reviewing engineering studies on airport proposals to evaluate their effects upon commissioned and/or proposed navigation aids, electromagnetic studies to evaluate the project on air navigation and communication facilities, reviewing and evaluating line-of-site (shadow) studies to determine impact on control tower visibility and frequency management problems and reserving frequencies.

If any turbines are relocated prior to construction, Goodhue Wind must provide notice to and receive a determination of "no hazard" from the FAA and Minnesota Department of Transportation, Aeronautical Division. The project will comply with FAA requirements with respect to turbine location and lighting requirements. This is addressed in the site permit at Section 4.12 and 7.18.

E. Access to Adjacent Homes by Medical Helicopters (Excerpt from ALJ's Summary)

"Some Goodhue County residents expressed concern about the ability of emergency medical helicopters to fly and land within the project area.

At the public hearing and thereafter, residents debated whether "Mayo One" helicopters could safely respond to medical emergencies occurring in the vicinity of placed turbines. Proponents and opponents of the project differed sharply as to whether the presence of wind turbines greatly increased the safety risks to helicopters, crew and passengers during such missions. Moreover, each side claimed that officials of the Mayo Clinic subscribed to their view as to the relative impacts turbines had on rescue missions."

OES EFP Response: There is no reason to conclude that the project poses any more risk to medical helicopters than any other wind farm located in the state. Officials at Mayo Clinic in Rochester have noted that impacts on helicopter operations due to wind projects in the area have been insignificant. (Environmental Report, p. 43.)

F. Impacts to Groundwater (Excerpt from ALJ's Summary)

"Some commentators expressed concerns over the potential for groundwater contamination from the project and the run-off that might be created by establishing additional impervious surface adjacent to the turbines.

For example, Erin Logan, a resident of Mineola Township, Minnesota, expressed concern that there would be significant impacts to groundwater when establishing the foundations for the proposed turbines. She asserts that the current siting of the project endangers one area that is highly-sensitive to groundwater contamination and four other areas that are very-highly-sensitive to groundwater contamination. Ms. Logan likewise disputed the accuracy of the Applicants estimate of the number of domestic wells within the project area."

OES EFP Response: Minnesota has nearly 2,000 wind turbines in operation or under construction. OES EPF staff is not aware of any adverse impacts to ground water from the installation of wind turbine foundations. Goodhue Wind will also design and implement a Storm Water Pollution Prevention Plan that identifies control measures for storm water pollution prevention during all phases of construction. Control measures will be inspected and documented on a weekly basis and within 24 hours of a 0.5-inch rain.

G. Impacts on Wildlife (Excerpt from ALJ's Summary)

"Several residents expressed concern over the impacts that wind turbines would have upon birds and wildlife in Goodhue County. They assert that the development of the project is likely to cause increased bird and bat mortality due to collisions with the turbines or their infrastructure; decreases in population due to loss and fragmentation of habitats; and disruption of migration flyways. For example, Betty Olson, of Zumbrota, Minnesota, submitted several articles as to the effect that wind turbines have had on wildlife.

The Minnesota Department of Natural Resources (DNR) reviewed the project's site permit application, environmental report, and draft site permit, and offered several comments. First, the DNR believes that AWA Goodhue has adequately addressed the project's proximity to Pioneer State Trail and has incorporated the appropriate wind access buffer. The DNR suggests, however, that AWA Goodhue seek to further clarify the permit language by adding state-owned trails to the list of public lands included in the condition labeled "III.C.4 Public Lands" or by including a special permit condition.

Second, while mindful that AWA Goodhue proposes to avoid an area of significant biodiversity (in Township 112N Range 16W Section 36), the DNR recommends that avoidance of this area be included by the Commission as a condition of the permit.

Likewise, the DNR urges AWA Goodhue to consult with it and the U.S. Fish and Wildlife Service upon completion of two pending surveys commissioned by AWA Goodhue: the Loggerhead Shrike Habitat Assessment and the Pre-Construction Avian Spring Migration Survey.

Further, the DNR recommends that AWA Goodhue revise Condition 9 on page 4 of the draft site permit. DNR asserts that the Soil Erosion and Sediment Control Plan should include methods of preventing the introduction of invasive species into the project site.

Finally, while commending AWA Goodhue for its pledge to notify the DNR whenever a large number of birds or bats are killed by collisions with the turbines, the DNR recommends that the site permit clearly establish the Applicant's reporting responsibilities. The DNR suggests that AWA Goodhue be obliged to make a report to the DNR in the event that five or more birds or bats are killed by the turbines within a single week."

OES EFP Response: The majority of the project area (over 72 percent) is used for agriculture. There are no DNR WMAs, SNAs, WPAs, State Parks or State Forests within the project area

AWA Goodhue completed a desktop avian and bat risk assessment to identify species of concern and assist in the development of field survey protocols focusing on those species. The assessment concluded that there are no federally listed birds or bats breeding records within Goodhue County. Goodhue County includes nine state-listed threatened, endangered or special concern avian and bat species. AWA Goodhue then conducted a Loggerhead Shrike Habitat Survey and Pre-Construction Spring Migration Survey to observe avian and bat species present within the project area. These assessments satisfy Tiers 1 and 2 and portions of Tier 3 of the USFWS Draft Guidelines for Wind Turbine Siting. Some of the major findings from the Loggerhead Shrike Habitat and Pre-Construction Spring Migration Survey are:

a. Nearly half of the project area is unsuitable for shrike breeding. Highly suitable and very highly suitable breeding habitat is widely dispersed through the project area.
b. No eagles' nests exist within the project area. No eagle flight paths were observed through the project area, and the project area contains little riparian habitat suitable for bald eagles.
c. Passerines (songbirds) accounted for 88 percent of the individual birds observed. Most passerines were generalist species that are adapted to the agricultural landscape. Waterfowl and waterbirds were notably scarce in the avian community, presumably due to the lack of suitable migration stopover and breeding habitat.
d. The risk of avian fatality has been minimized through project design strategies that minimize effects on avian habitats such as woodland, grassland and pasture.

Based on the survey results of AWA Goodhue's desktop study, Loggerhead Shrike Habitat Assessment and Pre-Construction Avian Spring Migration Survey, impacts of the project on wildlife are expected to be limited.

Setbacks from trails are evaluated in a Commission dockets on a case by case basis in keeping with in keeping with the Commission's Order issuing the General Permit Standards. In this instance the DNR has not provided any information in support of a setback for the Pioneer Trail. It should be noted that DNR commented that: "AWA Goodhue Wind has adequately addressed the project's proximity to the Pioneer State Trail…." Further, OES EFP staff does not believe

that "trails or snowmobile trails" warrant the same treatment as public lands. AWA Goodhue does not have wind rights or easements in that portion of section 36 in Vasa Township, which has been identified as an area of significant biodiversity.

The permit at Section 7.12 does address DNR's concern about language to prevent the introduction of invasive species into the project site. The permit at Section 6.7 also addresses avian and bat reporting requirements.

H. Levels of Stray Voltage (Excerpt from ALJ's Summary)

"A number of residents expressed concern over the effects of stray voltage on dairy cattle.

For example, Ann and David Buck, of Goodhue Township, Minnesota, own a large dairy farm within the footprint of the project. They relayed the story of an Ontario dairyman who lives near a wind farm. The dairyman notes that after a set of turbines were erected nearby, his livestock exhibited aggressive and erratic behavior, a decline in fertility, weight loss, and a high incidence of stillbirths. The dairyman believes that he was ultimately driven out of the dairy business by the health problems in his livestock. The Bucks predict that within weeks of completion of the Applicant's project, the milk production of their cows will drop significantly and the immune systems of their livestock will be compromised."

OES EFP Response: A great deal of research on the effects of stray voltage (NEV) on dairy cows has been conducted over the past 40 years. A comprehensive review of this research is presented in a report to the Ontario Energy Board (Literature Review and Synthesis of Research Findings on the Impact of Stray Voltage on Farm Operations, 2008, Prepared by Douglas J. Reinemann, Ph.D.). See eDockets 08-1233 (Doc. Id. 201010-55392-01).

The electrical collection system proposed for the Goodhue LWECS is designed to be "a separately derived system" as defined in the National Electric Code. The system will have no direct electrical connection (including grounded circuit conductors) to conductors originating in another system. The wind farm collection system will have its own substation and transformers. The Goodhue LWECS project does envision connection to the grid via two 69 kV lines, one existing and one new.

Because of the type of transformers used at each turbine and the design of the collection system, there are no ground currents in the collection system, whether the system is operating at zero generation or maximum generation. Therefore, under normal operating conditions, the grounding for the wind farm collection system has no current with which to create stray voltage.

2. Best Practices for Turbine Siting (Excerpt from ALJ's Summary)

A. Length of the Setbacks from Wind Turbines

"Related to the concerns expressed about the externalities from turbine construction, placement and operation, is a debate over the length of the appropriate setbacks. Much of the public testimony and comments received centered on this question. While differing as to their

recommendations, these commentators all urge the Commission to select a setback length in the siting permit that balances the rights of interests of those participating in the project with the rights and interests of those were are not participating in the project.

Mindful of both the Commission's *Order Establishing General Wind Permit Standards* provides for a minimum 500 foot setback from a home, and the Applicant's proposal for a 1,500 foot setback from non-participating residences, many commentators urged a still-larger setback of at least one-half mile. For example, Bruce and Marie McNamara urged adoption of a one-half mile minimum setback on the grounds that the Minnesota Department of Health's White Paper *Public Health Impacts of Wind Turbines* found that low frequency noise from a wind turbine is not easily perceived beyond one-half mile.

Supporters of the project argued that the Applicant's tripling of the minimum setback set forth in the Commission's *General Wind Permit Standards* is sufficient and strikes the right balance between the property rights of landowners and the interests of adjacent residents."

***OES EPF Response*:** Much of the discussion associated with setbacks relates to health and safety related issues. Clearly, on this issue there are sharp differences of opinions, with no consensus. In the literature there are peer reviewed articles, a considerable amount of grey literature and articles covering noise, health and safety. While it would be difficult to summarize or discuss these issues in detail, others have. Notable among them are the Department of Health Services in the State of Wisconsin, letter dated July 19, 2010, from Seth Foldy, State Health Officer and Administrator to Edward Marion [eDockets 08-1233, Doc Id. 201010-55414-01], and an August 13, 2009, letter from the Commissioner of the Minnesota Department of Health to Mr. and Mrs. Anderson.

> **State of Wisconsin Department of Health Services**
>
> DPH recognizes that wind turbines create certain exposures; audible sound, low-frequency sound, infrasound and vibration, and shadow flicker. Certain ranges of intensity or frequency of audible sound, low frequency sound, vibration and flicker have been associated with some objectively-verifiable human health conditions. Our review of the scientific literature concludes that exposure levels measured from contemporary wind turbines at current setbacks do not reach those associated with objective physical conditions, such as hearing loss, high blood pressure, or flicker-induced epilepsy.
>
> DPH staff previously reviewed the five reports you referenced in your letter. They also reviewed over 150 reports from the scientific and medical literature (published and unpublished) pertinent to the issue of wind turbines and health. DPH has also taken time to listen to, and respond to concerns voiced by local residents, municipalities, and local health department officials from across the State of Wisconsin. We have discussed this issue with colleagues at UW School of Medicine and Public Health, the Minnesota and Maine state health departments, and the Centers for Disease Control and prevention. From this we conclude that current scientific evidence is not sufficient to support a conclusion

that contemporary wind turbines cause adverse health outcomes in those living at distances consistent with current draft rules being considered by the Public Service Commission.

This is different from saying that future evidence about harm may not emerge, or that wind turbines will not change over time, or that annoyance and other quality-of-life considerations are irrelevant. DPH does not endorse a specific setback distance or noise threshold level relating to wind turbines. Nevertheless, in keeping with standard public health practice, DPH favors a conservative approach to setbacks and noise limits that provides more-than-minimum protection to those who live or work near wind turbines. These will help minimize local impacts on quality of life and serve as a buffer against possible unrecognized health effects.

…The most valuable studies would assess subjective complaints and objective clinical measurements in the setting of controlled or known environmental exposures. Such clinical studies fall outside the scope of standard public health investigations.

As additional scientific evidence becomes available, DPH will continue to appraise its relative strength, credibility, and applicability to the issue of wind turbine development in Wisconsin.

Minnesota Department of Health

In a letter to Mr. and Ms. Anderson, [Docket No. 08-1449 (Doc. ID. 20098-40926-01)], dated August 13, 2009, MDH Commissioner, Sanne Magnan, M.D. Ph.D, responded to specific questions posed by Mr. Anderson as follows:

Are current standards in Minnesota safe? Regulatory standards protect health and safety, but whether for air, water or Noise, regulators do not set "bright line: standards without also considering cost, technical difficulties, possible benefit and alternatives. No regulatory standard offers absolute safety. The Minnesota Department of Health can evaluate health impacts, but it is the purview of regulatory agencies to weight these impacts against alternative and possible benefits.

Are the proponents of wind turbines syndrome mistaken? As noted in the "White Paper," the evidence for wind turbine syndrome, a constellation of symptoms postulated as mediated by the vestibular system, is scant. Further, as also noted, there is evidence that the symptoms do not occur in the absence of perceived noise and vibration. The reported symptoms may or may not be caused by "discordant" stimulation of the vestibular system.

Does more study of adverse effects need to be undertaken? More study may answer questions about the actual prevalence of unpleasant symptoms and adverse effect under various conditions such as distance to wind turbines and distribution

of economic benefit. However, there is at present enough information to determine the need for better assessment of wind turbine noise, especially at low frequencies. Such assessments will likely be beneficial for minimizing impacts when projects are sited and designed. Also, even without further research, there is evidence that community acceptance of projects, including agreement about compensation of individuals within project areas, will result in fewer complaints. Therefore more research would be useful, but the need will have to be balanced against other research needs.

Similar conclusions and positions have also been taken by the state of Maine and the providence of Ontario.

Turbine setback requirements are addressed in the site permit in numerous places and specifically address setback related to homes, residences, non-participating landowners, public lands, microwave beam paths, land mobile radios, and noise.

B. Appropriateness of Turbines as a "Use" Within Agriculture Areas (Excerpt for ALJ's Summary)

"Several commentators questioned whether wind turbines were the best – or an appropriate – use on agricultural lands. Thus, a key question that divided commentators during the public hearings was whether turbines "harvest the wind" in the same way that heavy farm machinery harvests crops, or rather that wind turbines are better categorized as an "industrial" use. The commentators part company over the meaning of "farming" in modern day.

This debate manifests itself in the record in a number of different ways, but perhaps none more sharply than as to the residents' competing interests in the scenery along and above the horizon. Among the most difficult policy questions raised during the proceedings is the extent to which a landowner in an agricultural area has an interest in the "view shed" that lies above neighboring properties. Several commentators noted that they reside in Goodhue County precisely because of its rolling hills and picturesque landscapes – and the investments that they have made in their homes would be harmed by the siting of wind turbines along the horizon. Still other commentators argued that the ability to access the wind above a particular parcel is a central part of the land's productive potential and its value.

State Representatives Steve Drazkowski and Tim Kelly urge the Commission to sharpen this question still further by focusing on the special features of agricultural uses within the Project Area. They draw a distinction between Goodhue County and the areas in western and southern Minnesota that have successfully hosted wind farms. They argue that western and southern Minnesota is better suited to wind farms because it has flat terrain, is dominated by large crop farming operations, is not densely populated, and has fewer livestock operations. Conversely, Goodhue County has rolling hills and bluffs, is more densely populated per square mile and is home to many dairy farms.

A different, but related question is whether the installation of turbines unreasonably interferes with the expectations of adjacent cities. For example, in August of 2009, the City of Goodhue

passed a Resolution memorializing its opposition to "any wind tower facilities within two miles of the limits of the City of Goodhue." Similarly, in January of 2010, the City Council of the City of Zumbrota urged the Commission to "restrict the project area to two miles from the Zumbrota Corporate Limit." City officials, and others, assert that such zones without wind turbines are needed so as to permit later orderly development by these same cities. For its part, the Applicant asserts that the Cities' concerns over land for future development are not well grounded – because "less than 50 acres of farmland within the over 32,000 acre boundary are estimated to be permanently impacted by the Project."

Lastly, Erin Logan, a resident of Mineola Township, expressed concerned that the proposed project will utilize more prime farmland than is allowed under the Prime Farmland Exclusion. She urges the Commission to inquire into the number of prime farmland acres impacted by the project. As to this point, the Applicant asserts that the cited exclusion does not apply to the siting of Large Wind Energy Conversion Systems."

OES EFP Response: Minnesota has been a host to large wind energy conversion systems since 1993. LWECS projects permitted by the state and nearly all projects permitted by local units of government, primarily county, have been located on agricultural lands. Over these 17 years, wind energy development has proven itself to be very compatible with a variety of agricultural practices, including dairy, beef, poultry and a variety of field crops. Numerous farms in Minnesota that presently host wind turbines are similar in size and practices to the farms in the project area. While there may be more dairy farms within the footprint of this project, dairy operations are not inconsistent with wind energy development.

Legislative policies in Minnesota presently prevent development of nuclear, coal and hydro facilities and have directed utilities to add a significant percentage of renewable energy facilities to their generation assets. Consequently, utilities and independent power producers are advancing projects to implement this legislative directive. Development of wind energy facilities in Minnesota took place where the wind resource was most abundant, namely Buffalo Ridge in southwestern Minnesota. Over time and with advances in wind turbine technology other parts of the state have become viable areas for wind energy development.

Many concerns (safety, sound, land use and other) are often addressed by placing some level of distance between wind turbine and people, residences, roads, infrastructure and natural features. It is recognized that there may be no consensus on appropriate distances or types of setbacks. However, setbacks must be reasonable and allow some flexibility in the location of the turbines on the land in order to balance the needs and desires of the land owners, communities and developers. These considerations should balance the efficient use of the agricultural land, the wind resource itself and the need to minimize the projects impacts on surrounding land, roads, buildings, people and natural resources. The proposed setbacks in the site permit provide for a balance that protects the interests of both participants and non-participants.

The Goodhue Wind Project will be located in an area that is zoned for agriculture, which is an important economic sector in Goodhue County. The Project is consistent with the Goodhue County Comprehensive Plan, adopted in 2004, and lies completely outside the city limits of any

incorporated municipality and outside any Urban Fringe District identified in the 2004 Goodhue County Zoning Districts map.

Large wind energy conversion systems have been identified in the comprehensive plan as a compatible land use that complements and enhances existing agricultural infrastructure. The plan encourages cities to recognize the surrounding agricultural needs in their comprehensive plans. The county's policy regarding lands outside city growth zones stipulates they "will be considered rural and shall be managed to preserve the rural character and the continued operation of agricultural uses, their inherent activities, and lifestyle." The Economic Development policy related to agricultural industry includes ways to "preserve the land to support agricultural industry…and support the development of innovative industrial agricultural uses such as ethanol production, wind generation, buckwheat cleaning."

The project also lies outside the Low Density Residential/Urban Fringe/Agriculture land use zone identified in the 2003 Future Land Use/Transportation Plan map developed as part of the *TH 52 Corridor Zumbrota Sub-area Land Use/Transportation Study.* The city of Zumbrota, Goodhue County and Minneola, Pine Island, Roscoe and Zumbrota townships participated with Mn/DOT – District 6 in the study.

While both the cities of Goodhue and Zumbrota have requested that no turbines be placed within a two-mile buffer of each city's municipal boundaries, neither has an adopted comprehensive plan relating to future growth or expansion out two miles. In the proposed layout, no turbines will be sited within two miles of Goodhue; however, the proposed layout includes four turbines located on private land within two miles of Zumbrota, with the closest turbine approximately 1.25 miles from Zumbrota's municipal.

Goodhue Wind in its discussions with the city of Zumbrota has indicated that upon the expiration of its 20-year long power purchase agreement with Northern States Power, the turbines could be decommissioned and removed from the area.

Minnesota Statutes section 216F.07, provides that a site permit issued by the Commission "supersedes and preempts all zoning, building, or land use rules, regulations, or ordinances adopted by regional, county, local, and special purpose governments." None the less, land use issues are an important factor in siting wind projects and staff believes that local government planning and zoning have been appropriately considered in this docket and in development of the permit for this project.

With regard to Ms. Erin Logan inquiry concerning compliance with the Prime Farmland Exception in Minnesota Rules 7850.4400, subp.4, that section of Minnesota Rules applies to thermal energy facilities, not LWECS. The siting of LWECS is covered by Minnesota Statute section 216F.02 and Minnesota Rules chapter 7854. The wind turbines and access roads are expected to permanently displace approximately 50 acres of agricultural land, which is considerably less land than what is expected to be displaced by ex-urban development in the project area or lands removed from agriculture to accommodate growth projections by the cites of Goodhue and Zumbrota. The site permit in Section 7 and elsewhere provides for numerous mitigation measures on agricultural lands.

C. Impacts to Property Values (Excerpt from ALJ's Summary)

"A number of those participating in the public hearing, and submitting comments thereafter, expressed concerns over the impact of the wind farm project on property values in Goodhue County. State Representatives Steve Drazkowski and Tim Kellly, for example, noted that their discussions with local real estate agents, as well as landowners who have listed their property for sale, lead them to believe that property values will be negatively affected by the installation of the wind farm project. Some commentators suggested that land values could drop by 30 percent or more.

Schleck and Associates, appearing on behalf of Steve Groth and Ann Buck, suggested that AWA Goodhue be required to buy Property Value Guaranty Insurance for the non-participating property owners whose property values will be negatively affected by the project."

OES EFP Response: Impact to property values is often a concern to affected residents. However, residents have not offered any specific evidence which supports such a claim. The best evidence on the subject matter is the Lawrence Berkley National Laboratory study "The Impact of Wind Power Projects on Residential Property Values in the United States" (Dec. 2009) study. That report shows an absence of negative impacts to property values from wind farms within a project view shed. "A Study of Wind Energy Conversion System in Minnesota," prepared by the Stearns county, Minnesota, Assessor's Office (June 1, 2010) asked assessors from Dodge, Jackson, Lincoln, Martin, Mower and Murray counties "if they have seen any changes on properties hosting a wind energy conversion system and on properties adjacent to property with a tower located on it." Their responses noted that there were "no changes," but also indicated that "The collected data is insufficient to allow for a reasonable analysis of the effects of wind energy development on land values."

Moreover, because it is difficult to determine what effect the construction of the turbines will have on property values, some residents suggested that the Permittee be required to purchase property value guaranty insurance for non-participating property owners. The Commission has not required any other wind project in Minnesota to purchase such insurance and OES EFP staff finds no rationale for doing so here.

3. Concerns as to this Application (Excerpt from ALJ's Summary)

Items III. A. Demands for Electric Energy and B. C-BED Project Designation of the ALJ's "Summary of Public Testimony" are not relevant to the site permit proceedings.

C. Post-Installation Remedies for Damages

"Some residents of Goodhue County questioned whether there would be effective remedies for damages they incur due to the installation of the project. These individuals assert that AWA Goodhue or the State of Minnesota should provide assistance those who are adversely affected by turbine noise, shadow flicker or diminutions in the value of their land.

For example, Robert Weiss, General Manager of Hector Communications, commented on behalf of Sleepy Eye Telephone Company. Sleepy Eye Telephone Company has buried copper cables and fiber optic cables in the right-of-ways of Goodhue County roads. The company is concerned that the transmission lines carrying the electricity generated by the wind turbines may create electrical interference with the underground cables, rendering them unusable. Mr. Weiss asserted that a similar situation occurred near Lake Benton, Minnesota, at the Buffalo Ridge wind facility. The company contends that any costs to mitigate or eliminate noise problems on the company's buried cables that can be linked to the wind project should be borne by AWA Goodhue."

***OES EFP Response*:** See property value discussion immediately above in 2.C.

Sleepy Eye Telephone Company, a wholly owned subsidiary of Hector Communications, and the telephone service provider in the project area expressed concern about the potential for its telephone service being impacted by interference from overhead power lines paralleling public rights-of-way where their copper cables are located. Hector Communications asked the electrical noise and interference issue be addressed in the final order issued by the Commission. In an October 4, 2010, memorandum to Goodhue County staff, Goodhue Wind indicated that:

a) The GE 1.5 and 1.6 MW state-of-the art MW wind turbine generators have full AC/DC/AC converters to eliminate electrical noise and interference by electrically isolating the WTG from the grid.
b) Road crossings will be made as necessary to mitigate interference.
c) Goodhue Wind plans to install an optional electrostatic shield on the transformers between the high side/low side windings which will eliminate any coupling due to capacitor resonance as a good practice measure.
d) Goodhue Wind also plans to be fully compliant with MISO/FERC/Xcel/GRE Good Electric Industry practice which includes IEEE 519 and 820 compliance standards.
e) Goodhue Wind will also conduct a detailed harmonic analysis to eliminate any coupling due to harmonics above the 14^{th} harmonic.

Goodhue has also indicted that it will make every effort to keep the electrical noise and interference below established threshold levels, and work closely with Sleepy Eye Telephone Company and Goodhue County during the design and engineer phase. Interference issues are also addressed in the site permit at Section 4.15.

4. Key Claims of the Project's Proponents (Excerpt for ALJ's Summary)

"Proponents of the project advance four key arguments in support of the granting the requested permits. They assert that the Project: (1) assists Minnesota in achieving its renewable energy goals; (2) contributes to the diversity of state energy sources; (3) provides needed stimulus to the local economy; and (4) reflects the best available science. State Senator Steve Murphy touched upon each of these contentions when he testified at the June 21 public hearing. He remarked:

> Now, in our area, we already have a nuclear power plant, one of the best run nuclear power plants any place on the planet. We have a garbage-to-energy project, an RDF facility, one of best run one any place in the state. We also have

energy produced by using natural gas. Now, about the only energy production that we don't have in this area … is coal and wind. Quite frankly, I don't want coal at all and I think wind is a good resource and it fits with the energy diversity of this area.

The other thing, Your Honor, and I think one of the very important things, is that this means $20 million to the local economy. Now, there's not an economy, there's not a town or a township or a county any place in Minnesota or the United States that couldn't use some windmills generating $20 million of revenue for the local community. Now, is that the sole reason to support this? Absolutely not….

Goodhue Wind wants to put forward the best project possible. That's why they've agreed voluntarily to double their setback limits, they're willing to sit down and talk with individual landowners. This is good project, Your Honor, it needs to continue to move forward."

OES EFP Response: There is no response to the above comments.

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The Administrative Law Judge's "Summary of Public Testimony" and the record of this proceeding accurately reflect the considerable controversy associated with the Goodhue Wind Project, and acknowledges that there are proponents and opponents with regard to nearly all facets of the project and there are going to distinct viewpoints and opinions that may be beyond reconciliation. It is worth noting that nearly all information in the record with regard to perceived impacts and concerns is based on information from other states and countries, not Minnesota. To date, the Environmental Quality Board and the Commission have issued site permits for more than 18 LWECS projects representing more than 1,500 MW that are in commercial operations, some for more than 10 years now. Another 300 to 400 MW have also been permitted by local units of government that are also in commercial operation. Presently another 615 MW are under construction.

Permits issued for these project and projects under Commission review have been subject to nearly all of the same permit conditions and setback requirements. Minnesota's extensive experience with permitting LWECS indicates that the concerns and issues identified in this proceeding have not been associated with LWECS permitted by the state or local units of government. Several thousand Minnesota landowners and their neighbors are hosts to LWECS and associated facilities in their communities. Complaints and concerns about any aspect of the operational wind turbines and associated facilities are uncommon.

The setbacks in the proposed site permit are similar to setback requirements in other Commission issued site permits. Although the Goodhue Wind Project area has a somewhat higher population density than some other areas where there are LWECS, AWA Goodhue has demonstrated that it can and will comply with the setback requirements. The setback requirements have eliminated considerable portion of land within the project area. Unlike the city of New Ulm which sought an exemption from setbacks, Goodhue is not seeking or asking for an exemption from any of the setback requirements in the permit. Far from giving AWA Goodhue, LLC unlimited discretion,

the proposed site permit imposes a number of setback, conditions and other requirements with which AWA Goodhue must comply. These standards and requirements have been applied on a uniform and consistent basis and do provide developers with strong guidance that also protects the public health and safety of both project participants and non-participants, consistent with Minnesota's legislative policy for development and siting of LWECS in Minnesota.

The OES EFP staff believes the record in this matter is sufficiently robust to allow the Commission to make a decision on the site permit application. OES EFP also believes the proposed site permit provides sufficient measures to provide necessary guidance regarding project design, construction, restoration, monitoring and operation of the proposed Goodhue Wind Project. There are numerous site permit requirements that protect natural resource features as well as public health and safety.

Based on the record of this proceeding, OES EFP staff concludes that the Goodhue Wind Project meets the procedural requirements and the criteria and standards for issuance of a site permit identified in Minnesota Statutes and Rules. The site permit application has been reviewed pursuant to the requirement of Minnesota Rules Chapter 7854 (Wind Siting Rules).

In accordance with Minnesota Rule 7854.0500 Subp.2, the Commission may not issue a site permit for an LWECS, for which a certificate of need is required, until an applicant obtains such a certificate from the Commission.

OES EFP staff has prepared for Commission consideration proposed Findings of Fact, Conclusions and Order, and an Exhibit List for the Goodhue Wind Project and a proposed Site Permit.

Proposed Findings of Fact

The proposed Findings (see Attachment 2 in the Commissioner's packet) address the procedural aspects of the process followed, describe the project, and address the environmental and other considerations of the project. The relevant site considerations addressed in the Findings of Fact (such as human settlement, public health and safety, noise, recreational resources, community benefits, effects on land based economies, archaeological and historical resources, animals and wildlife and surface water) track the considerations described in the Minnesota Power Plant Siting Act for other types of power plants that are pertinent to wind projects. The proposed Findings of Fact reflect some findings that were also made for other LWECS projects. The following outline identifies the categories of the Findings of Fact.

Exhibit List

OES EFP staff has prepared an exhibit list of documents that are part of the record in this permit proceeding. See Attachment 3 in Commissioner's packet. **Other exhibits referenced are from the Master Exhibit List or eDockets (08-1233)**

Proposed Site Permit

The OES EFP Staff has prepared a site permit for the Commission's consideration. See Attachment 4 in the Commissioner's packet. The conditions in this proposed Site Permit are similar to other conditions included in other LWECS site permits issued by the Environmental Quality Board and the Commission. The proposed site permit is different from the preliminary site permit issued by the Commission. The site permit headings and requirements have been reorganized and modified to better reflect the designated site and where turbines and associated facilities are to be located within the designated site boundaries. Other structural modifications have attempted to improve the overall layout and organization of the permit to provide for greater clarity, while tightening up and clarifying language in the permit conditions.

Commission Decision Options

A. Goodhue Wind Project Findings of Fact and Conclusions

1. Adopt the attached Findings of Fact, Conclusions of Law and Order prepared for the 78 MW Goodhue Wind Project and associated facilities in Goodhue County.

2. Amend the Findings of Fact and Conclusions of Law as deemed appropriate.

3. Make some other decision deemed more appropriate.

B. LWECS Site Permit for the 78 MW Goodhue Wind Project

1. Issue the proposed LWECS Site Permit for the 78 MW Goodhue Wind Project to AWA Goodhue, LLC.

2. Amend the proposed LWECS Site Permit as deemed appropriate.

3. Deny the LWECS Site Permit.

4. Make some other decision deemed more appropriate.

OES EFP Staff Recommendation: The staff recommends Options A1 and B1.